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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/643,520 | 08/18/2003 | Shenlin Chen | 2002-0864.00/US | 4492 |

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EXAMINER

EVERHART, CARIDAD

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2825

DATE MAILED: 04/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/643,520

Applicant(s)

CHEN ET AL.

Examiner

Caridad M. Everhart

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 41-43 is/are allowed.
- 6) ☒ Claim(s) 1-6, 10-13, 17-20, 24, 25, 27-30, 32, 33 and 35-39 is/are rejected.
- 7) ☒ Claim(s) 7-9, 14-16, 21-23, 26, 31, 34 and 40 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>filed 8/18/2003</u> | 6) <input type="checkbox"/> Other: ____ |

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Jones, et al. ("Jones")(US 2003/0102469A1).

Jones discloses forming hemispherical silicon, which forms a structure having a textured surface(paragraph 0020 and Fig. 3), and forming an epitaxial layer, which may be silicon((paragraph 0030), as the disclosure that the epitaxial layer may be of the material of the silicon nanocrystals, which are the hemispherical silicon.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-6,10, 13, 17, 19,20,27, 30,32,35,36, 38, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al ("Han")(US 5,405,801) in view of JP2002222871A1("Kato")(abstract only).

Han discloses forming a a capacitor by forming a rugged structure(Fig. 25) by forming rugged polysilicon and forming epitaxial silicon on the rugged polysilicon(col. 8, lines 60-67). Han discloses silane(col. 2, lines 13-16). Han discloses dichlorosilane and the temperatures which include the recited temperature(col. 4, lines 35-40 and col. 8, loines 61-67). The thickness includes the recited thicknesses(col. 8, lines 65-67). Han teaches a plug of polysilicon(Fig. 27, above feature 14). Han teaches a transistor(col. 9, lines 23-44). Han discloses a memory cell (Fig. 28) which includes a transistor and a storage node which is a capacitor. The underlying polysilicon plug can be seen making contact with region 14.

Han is silent with respect to the rugged polysilicon being hemispherical polysilicon.

Kato is relied upon to show that rugged polysilicon is another term for HSG, or hemispherical grain silicon(abstract).

It would have been obvious to one of ordinary skill in the art that the rugged polysilicon taught by Han is hemispherical because Kato teaches that the rugged polysilicon is HSG.

Claims 11,12,18,24,25,28,29,33, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han in view of Kato as applied to claim 1 above, and further in view of Wu, et al. ("Wu")(US 20020064956) .

Han is silent with respect to the etching of the capacitor plate and with respect to an amorphous silicon layer beneath the plug.

With respect to the etching of the capacitor plate layer, it is seen in Fig. 27-29 of Han that the capacitor plate can have different shapes. It can be seen for example in Fig. 29 that the layers 100 and 110, which is the HSG layer, have been formed into the portion of a trench shown. It would have been obvious to one of ordinary skill in the art to have etched the layers to have formed the layers to cover the areas shown in Fig. 29.

With respect to the layer of amorphous silicon, Wu teaches a layer of amorphous silicon beneath the polysilicon of the HSG layer (paragraphs 0014 and 0023). It would have been obvious to one of ordinary skill in the art to have combined this step with the process taught by Han in view of Kato because Wu teaches that this step simplifies the process of forming a capacitor(paragraph 0025).

Claim Objections

Claim 38 is objected to because of the following informalities: There is not antecedent basis in claim 35 upon which claim 38 depends for the recitation "the amorphous silicon layer" in claim 38. Appropriate correction is required.

Allowable Subject Matter

Claims 41-43 are allowed.

Claims 7,8,9,14,15,16,21,22,23,26,31,34, and 40 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not teach or suggest the limitations "cycle...at a temperature of ... 750-900" nor "oblong silicon shape...more thickness in a vertical direction...".

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.


For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

C. Everhart

3-19-2004


CARIDAD EVERHART
PRIMARY EXAMINER